UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS

MICHAEL SANDBORN & MARK SANDBORN PARTNERSHIP, MICHAEL SANDBORN, MARK SANDBORN, and MS SQUARED,	)	**Civil No. 11-11472-FDS**
Plaintiffs and Counter Defendants,	)	
v.	)	
AVID TECHNOLOGY, INC.,	)	
Defendant and Counter Claimant.	)	

MEMORANDUM AND ORDER ON CLAIM CONSTRUCTION

SAYLOR, J.

This is a patent infringement action involving musical notations that use color to demonstrate harmonic structure. The patent at issue, U.S. Patent No. 6,930,235 B2 (the "'235 patent"), claims methods and systems for correlating colors with musical notes. Plaintiffs Michael Sandborn & Mark Sandborn Partnership, Michael Sandborn, Mark Sandborn, and MS Squared seek a judgment under 35 U.S.C. § 271 that their patent is infringed by a software program, Sibelius, that was created by defendant Avid Technology, Inc. Defendant has asserted a number of counterclaims, including claims of non-infringement and invalidity.

The case is at the claim construction stage. The parties dispute the meaning of the term "consecutive chromatic colors" in claim 102. Defendant also contends that three of plaintiffs' claims—72, 74, and 75—are invalid because plaintiff has failed to identify a structure for those claims.

I. Background

A. Factual Background

The facts are set forth as alleged in the complaint.

On August 16, 2005, the United States Patent and Trademark Office issued the '235 patent. (Am. Compl. ¶ 9). The patent covers methods and systems for (1) "assigning colors to musical notes and musical notation," (2) "creat[ing] musical notation with colors," and (3) "read[ing] and display[ing] such musical notation." (*Id*.) The Michael Sandborn & Mark Sandborn Partnership, Michael Sandborn, Mark Sandborn, and MS Squared own the rights to the '235 patent. (Am. Compl. ¶ 10).

Defendant Avid Technology, Inc. owns the right to a popular software product, Sibelius, that creates, reads, displays, and prints musical scores. (Am. Compl. ¶ 11). Among other options, Sibelius offers users the ability to create scores that include colored annotations. (*Id*.). Plaintiff alleges that Sibelius infringes, or has infringed, the methods and systems set forth in the '235 patent. (*Id.*).

According to plaintiffs, Avid was made aware of the existence of the '235 patent in February 2009. (Am. Compl. ¶ 13). Avid did not seek a license to use the patented methods or systems, nor did it remove the use of those methods and systems from its product. (*Id.*).

In May 2009, Avid released a new version of Sibelius, called version 6. (Am. Compl. ¶ 14). The version eliminated the "Pitch Spectrum" feature, which had previously created colored musical scores. (*Id.*). Sibelius users complained about the removal of the "Pitch Spectrum" feature. (Am. Compl. ¶ 15). The complaint alleges that an Avid employee indicated that it was removed "for legal reasons," and the same employee and others posted "work-arounds" on the

Avid website to allow users to restore the functionality of the feature to version 6. (Am. Compl. ¶¶ 15-16).

Plaintiffs filed the present suit on August 17, 2011. Avid answered the complaint on December 19, 2011, and filed counterclaims of invalidity and non-infringement. The parties proceeded with discovery until August 9, 2012, when a suggestion of bankruptcy was filed in the case regarding Michael Sandborn. The parties requested, and were granted, a stay of the action pending resolution of the bankruptcy issues. In February 2013, the stay was lifted. On April 29, 2014, the Court held a *Markman* hearing on the disputed terms in the claims.

B. The Claimed Invention

The '235 patent claims a process for relating music to colors. Specifically, it claims a method and system wherein twelve colors in a color spectrum are assigned to the twelve tones of a chromatic scale based on their positions in the musical circle of fifths.[1] The colors and tones are assigned according to proximity on each respective scale, so that the colors that are closest to each other on the spectrum correspond with the tones that share the most harmonic relationships. According to plaintiffs, the color scheme aids in music education by making additional information about the harmonic structure of a piece readily apparent, and accordingly offers an improvement over previous systems of musical notation.

II. "Consecutive Chromatic Colors"

A. Legal Framework

The construction of claim terms is a question of law. *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 372 (1996) ("[T]he construction of a patent, including terms of art within its

[1] Somewhat confusingly, the word "tone" can also mean a quality or value relating to color. It appears that the patent uses the word "tone" to refer exclusively to musical tones. This opinion will adopt that approach as well.

claim, is exclusively within the province of the court.").

In *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (*en banc*), the Federal Circuit clarified the proper approach to claim construction and set forth principles for determining the hierarchy and weight of the definitional sources that give a patent its meaning. The guiding principle of construction is "the meaning that the term would have to a person of ordinary skill in the art in question at the time of . . . the effective filing date of the patent application." *Id.* at 1313. Courts thus seek clarification of meaning in "the words of the claims themselves, the remainder of the specification, the prosecution history, and extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art." *Id.* at 1314 (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys.*, 381 F.3d 1111, 1116 (Fed. Cir. 2004)).

1. The Words of the Claims Themselves

The claim construction analysis normally begins with the claims themselves.[2] The claims of a patent "define the invention to which the patentee is entitled the right to exclude." *Id.* at 1312 (citing *Innova*, 381 F.3d at 1115).

A court may construe a claim term to have its plain meaning when such a construction

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[2] In *Phillips*, the Federal Circuit discredited the practice of starting the claim construction analysis with broad definitions found in dictionaries and other extrinsic sources:

> [I]f the district court starts with the broad dictionary definition . . . and fails to fully appreciate how the specification implicitly limits that definition, the error will systematically cause the construction of the claim to be unduly expansive. The risk of systematic overbreadth is greatly reduced if the court instead focuses at the outset on how the patentee used the claim term in the claims, specification, and prosecution history, rather than starting with a broad definition and whittling it down.

Id. at 1321. Of course, if no special meaning is apparent after reviewing the intrinsic evidence, claim construction might then "involve[] little more than the application of the widely accepted meaning of commonly understood words." *Id.* at 1314.

resolves a dispute between the parties. *See O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1361 (Fed. Cir. 2008); *see also U.S. Surgical Corp. v. Ethicon, Inc.*, 103 F.3d 1554, 1568 (Fed. Cir. 1997) ("Claim construction is a matter of resolution of disputed meanings and technical scope, to clarify and when necessary to explain what the patentee covered by the claims, . . . [but] is not an obligatory exercise in redundancy.").

In some instances, it is the arrangement of the disputed term in the claims that is dispositive. "This court's cases provide numerous . . . examples in which the use of a term within the claim provides a firm basis for construing the term." *Phillips*, 415 F.3d at 1314. For example, because claim terms are normally used consistently throughout the patent, the meaning of a term in one claim is likely the meaning of that same term in another. *Id.* In addition, "the presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim." *Id.* at 1314-15.

2. <u>The Specification</u>

"The claims, of course, do not stand alone." *Id.* at 1315. Rather, "they are part of a fully integrated written instrument, consisting principally of a specification that concludes with the claims." *Id.* (citations and internal quotation marks omitted). For that reason, the specification must always be consulted to determine a claim's intended meaning. "[T]he specification is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term." *Id.* (citing *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)).

"In general, the scope and outer boundary of claims is set by the patentee's description of his invention." *On Demand Mach. Corp. v. Ingram Indus.*, 442 F.3d 1331, 1338 (Fed. Cir.

2006); *see also Phillips*, 415 F.3d at 1315-1317 ("[T]he interpretation to be given a term can only be determined and confirmed with a full understanding of what the inventors actually invented and intended to envelop with the claim"). "[T]he specification may reveal a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess." *Phillips*, 415 F.3d at 1316. It may also reveal "an intentional disclaimer, or disavowal, of claim scope by the inventor." *Id.* Therefore, the claims are to be construed in a way that makes them consistent with, and no broader than, the invention disclosed in the specification. *On Demand*, 442 F.3d at 1340 ("[C]laims cannot be of broader scope than the invention that is set forth in the specification."); *Phillips*, 415 F.3d at 1316 ("[C]laims must be construed so as to be consistent with the specification, of which they are a part.").

Nevertheless, courts must be careful to "us[e] the specification [only] to interpret the meaning of a claim" and not to "import[] limitations from the specification into the claim." *Phillips*, 415 F.3d at 1323; *see also Gillette Co. v. Energizer Holdings, Inc.*, 405 F.3d 1367, 1375 (Fed. Cir. 2005) (internal quotation marks omitted). A patent's "claims, not specification embodiments, define the scope of patent protection." *Kara Tech. Inc. v. Stamps.com Inc.*, 582 F.3d 1341, 1348 (Fed. Cir. 2009); *see also Martek Biosciences Corp. v. Nutrinova, Inc.*, 579 F.3d 1363, 1381 (Fed. Cir. 2009) ("[E]mbodiments appearing in the written description will not be used to limit claim language that has broader effect."). "In particular, we have expressly rejected the contention that if a patent describes only a single embodiment, the claims of the patent must be construed as being limited to that embodiment." *Phillips*, 415 F.3d at 1323. This is "because persons of ordinary skill in the art rarely would confine their definitions of terms to the exact representations depicted in the embodiments." *Id.*

Although this distinction "can be a difficult one to apply in practice[,] . . . . the line between construing terms and importing limitations can be discerned with reasonable certainty and predictability if the court's focus remains on understanding how a person of ordinary skill in the art would understand the claim terms." *Id.* Ultimately, "[t]he construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will be, in the end, the correct construction." *Id.* at 1316 (citing *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998)).

3. <u>The Prosecution History</u>

After the specification and the claims themselves, the prosecution history is the next best indicator of term meaning. The prosecution history consists of the complete record of the proceedings before the PTO and includes the prior art cited during the examination of the patent. *Id.* at 1317. "Like the specification, the prosecution history provides evidence of how the PTO and the inventor understood the patent." *Id.* "[T]he prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be." *Id.* (citing *Vitronics*, 90 F.3d at 1582-83).

However, "because the prosecution history represents an ongoing negotiation between the PTO and the applicant, rather than the final product of that negotiation, it often lacks the clarity of the specification and thus is less useful for claim construction purposes." *Id.* As a result, courts generally require that "a patent applicant [] clearly and unambiguously express surrender of [a] subject matter" to disavow claim scope during prosecution. *Voda v. Cordis Corp.*, 536 F.3d 1311, 1321 (Fed. Cir. 2008) (quoting *Sorensen v. International Trade Comm'n*,

427 F.3d 1375, 1378 (Fed. Cir. 2005)).

4. Extrinsic Sources

Extrinsic evidence consists of "all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises." *Phillips*, 415 F.3d at 1317. It "can help educate the court regarding the field of the invention and can help the court determine what a person of ordinary skill in the art would understand claim terms to mean." *Id.* at 1319. However, extrinsic evidence suffers from a number of defects, including its independence from the patent, potential bias, and varying relevance. *Id.* at 1318-19. Such evidence is therefore "unlikely to result in a reliable interpretation of patent claim scope unless considered in the context of the intrinsic evidence," and courts may consider, or reject, such evidence at their discretion. *Id.* at 1319.

B. Construction of the Disputed Term

Claim 102 of the patent is as follows:

> a notation system on a recordable medium, comprising:
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> logic configured to display a ledger line and five staff lines and spaces between the lines and the ledger line and the lines; and
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> logic configured to display twelve consecutive chromatic notes representing consecutive tones of a musical 5th relationship, wherein the consecutive chromatic notes are applied consecutively to the lines and spaces, wherein the twelve consecutive notes are configured with consecutive chromatic colors, wherein the colors are twelve fundamental colors representative of at least one of selected colors, chromas, and grays.

'235 patent at 68:23-35.

The parties dispute the meaning of the term "consecutive chromatic colors." Plaintiffs contend that the term should be defined as "consecutive colors assigned by the invention to

consecutive chromatic tones. Figure 18 of the '235 [p]atent illustrates consecutive chromatic colors." (Pl. Mem. at 4). Defendant contends that the term should be defined as "[c]onsecutive fundamental colors with hue indicating the relative octave, volume, or rhythm of the tone." (Def. Mem. at 20).

1. Ordinary Meaning

The Court looks first to the ordinary meaning of the term and how it is used in the claims; if this provides a "firm basis for construing the term," then the inquiry is over. *Phillips*, 415 F.3d at 1314. Plaintiffs, citing a Merriam-Webster dictionary, contend that the word "chromatic" is usually defined as "having to do with color," and thus the phrase "consecutive chromatic colors" has no ordinary meaning because "colors having to do with color" is "clearly an unhelpful formulation" of the phrase. (Pl. Mem. at 7-8). Defendant, citing two online dictionaries, contends that the ordinary meaning of "chromatic color" is "a color that has a hue." (Def. Mem. at 20). In response, plaintiffs contend that defendant's definition of "chromatic color" is unworkable because claim 102 requires the "consecutive chromatic colors" to be "twelve fundamental colors representative of at least one of selected colors, chromas, and grays." (Pl. Reply at 12). Plaintiffs contend that because grays have no hue, defendant's definition is unworkable in the context of the '235 patent.

At the very least, the term "consecutive chromatic colors" appears to have no clear and ordinary meaning that would allow the term to be construed based solely on the claims. The Court therefore turns to the question whether "the specification . . . reveal[s] a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess." *Phillips*, 415 F.3d at 1316.

2. The Specification

Defendant contends that the specification supports its definition of "consecutive chromatic colors" because the specification "describes using *hue to indicate tonal properties*." (Def. Mem. at 21 (emphasis in original)). The cited sections of the specification state:

> First, octaves in color are achieved through changes in energy intensity. The change in energy intensity is governed by the gray scale. . . . For the "C" color-tone representing the color yellow, for example, the "C" overtone octave series moves to progressively lighter yellow tints until it effectively becomes white, as shown in FIG. 10A. The "C" undertone series moves to progressively darker yellow shades until it effectively becomes black, as shown in FIG. 10B. If the fundamental "C" is placed at the center of the hearing range, then a pure yellow hue is the starting color position. As the harmonic series progresses through the octaves, the "C" color tone becomes lighter (overtone) fading to white or darker (undertone) fading to black.
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> . . .
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> FIG. 61D includes another display screen 6100D that shows mixtures of tone octaves, [sic] and chromatic colors within the area of a circle. The center of the circle is chosen to represent low octaves (dark gray) 6180, the middle radius is chosen to represent tones within the central hearing range (middle gray) 6185, which are organized by chromatic color relationships 6187, and the circumference is chosen to represent high octaves (light gray) 6170. Radial motion from low to high octaves moves between successive mixtures of octaves. Angular motion moves between successive mixtures of chromatic colors (tones related by 15:16 or 16:15, and/or 17:16 or 16:17 relationships).

'235 patent at 11:36-60, 44:22-33.

The quoted language does not, however, support defendant's proposed definition. The description of the "intensity" of color in these passages, to a person skilled in the art, describes a change in the brightness of the color, not a change in the hue of the color. *See id.* Thus, the cited passages of the specification explain that brightness, rather than hue, is sometimes used as an indicator of octave.

It is true, as defendant points out, that the consecutive chromatic colors can be used to

indicate qualities such as octave, volume, or rhythm. For example, claim 44 uses consecutive chromatic colors "to define consecutive chromatic volume notes," and claim 46 uses them "to define consecutive chromatic rhythm notes." '235 patent at 59:15-17, 36-38. However, the language of claim 102 associates "consecutive chromatic colors" with "consecutive chromatic notes." *Id.* at 68: 32-33. The specification also states that "successive mixtures of chromatic colors" can represent "tones related by 15:16 or 16:15, and/or 17:16 or 16:17 relationships." *Id.* at 44:20-21, 32-33. That means that a change in chromatic color is associated with a change in tone.

From the way it is used in the claims and its description in the specification, the term "consecutive chromatic colors" can be correlated with several different types of sound qualities, depending on what function the invention is performing. Thus, a "chromatic color" can represent octave, volume, rhythm, tone, or some other sound quality. The variability of the use of the term means that defendant's proposed definition, which requires that the hue of the color represent octave, volume, or rhythm, is unduly limiting. Claim 102 does not mention octave, volume, or rhythm, and the system described in claim 102 is designed to display notes where the colors of the notes are associated with tones based on the musical relationship of the circle of fifths.

The shifting nature of the term "consecutive chromatic colors" supports plaintiffs' proposed definition for the term. Plaintiffs contend that the phrase "concerns the ordering of colors as part of the process of configuring 'consecutive chromatic notes' with colors." (Pl. Mem. at 9).[3] Thus, they contend that "consecutive chromatic colors" means "[c]onsecutive

[3] The parties have agreed that "consecutive chromatic notes" are "consecutive notes of a western musical scale consisting entirely of half steps." (Joint Claim Constr. & Pre-Hr'g Statement, Ex. B ¶ 16).

colors assigned by the invention to consecutive chromatic tones." (Joint Claim Constr. & Pre-Hr'g Statement, Ex. A at 4).

Support for plaintiffs' proposed definition can also be found in the specification. First, the specification describes a "chromatic color pattern" that the invention can display. *See* '235 patent at 16:50, 49:17. For example, when describing the color pattern for the musical relationship called the "bonded harmonic 3," the specification states that "[t]he color is calculated by the color relationship between 1/3 and 3 which is 3 octaves plus 2 chromatic tones which equates to a total color change of 2 chromatic colors." *Id.* at 17:12-16. That section of the specification associates change in chromatic color with change in tone, further describing a system where the colors are placed in a certain order based on the tones with which they are associated. That order is distinct from the order of "analogous colors," *see id.* at 47:38-39, which the parties agree are "neighboring colors such that no other defined color is found in between neighboring colors." (Joint Claim Constr. & Pre-Hr'g Statement, Ex. B ¶ 9); *see also Helmsderfer v. Bobrick Washroom Equip., Inc.*, 527 F.3d 1379, 1381-82 (Fed. Cir. 2008) ("[D]ifferent claim terms are presumed to have different meanings.").

According to the patent specification, analogous colors are ordered based on the closeness of the color associations themselves. *See* '235 patent at 11:61-65 ("An analogous color is a neighboring color such that no other defined color is found in between neighboring colors."). That order goes from yellow, to yellow-green, to green, to blue-green, to blue, to blue-violet, to violet, to red-violet, to red, to red-orange, to orange, to yellow-orange. *See id.*, figure 11, figure 14A. In contrast, chromatic colors are associated with certain tones by the invention and ordered by tone. *See id.* at 44:31-33. An example of a possible order of consecutive

chromatic colors is shown by figure 18, which proceeds from yellow, to red-violet, to green, to red-orange, to blue, to yellow-orange, to violet, to yellow-green, to red, to blue-green, to orange, to blue-violet, and back to yellow. *See id.*, figure 18. Figures 61C and 61D show the difference between the order of analogous colors and the order of chromatic colors when they are placed around a color wheel. *Compare id.*, figure 61C *with id.*, figure 61D. Those distinctions in the specification support plaintiff's proposed definition.

In sum, the specification shows that the invention can place colors in an order based on how the tones with which they are associated are ordered in a chromatic scale. That aligns directly with plaintiffs' proposed definition of the term "consecutive chromatic colors": consecutive colors assigned by the invention to consecutive chromatic tones. An example of a particular order of the colors the invention can produce is shown in figure 18 of the specification. There is no evidence in the specification supporting the limitations proposed by defendant, where the hue of the color must represent octave, volume, or rhythm.

Finally, defendant contends that plaintiffs' proposed definition conflates the term "chromatic colors" with "chromatic notes." However, while the definition is dependent on how the invention assigns colors to tones, it is not duplicative. The term "chromatic notes," as explained earlier, means "notes of a western musical scale consisting entirely of half steps." (Joint Claim Constr. & Pre-Hr'g Statement, Ex. B ¶ 15). The term "chromatic colors" refers to the colors assigned to those notes by the invention, and the order in which they are listed according to the chromatic note scale. Plaintiffs' proposed construction therefore does not improperly equate "chromatic notes" with "chromatic colors."

The Court therefore interprets "consecutive chromatic colors" to mean "consecutive

colors assigned by the invention to consecutive chromatic tones." The Court further concludes that figure 18 of the '235 patent illustrates consecutive chromatic colors. Because the meaning of the term is sufficiently clear from the patent specification, there is no need to consult the prosecution history or outside evidence. *See Phillips*, 415 F.3d at 1315.

III. Claims 72, 74, and 75

Defendant contends that three of plaintiff's claims—72, 74, and 75—are indefinite, and therefore unenforceable, because they are means-plus-function claims without a corresponding structure. Under the Patent Act,

> [a]n element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

35 U.S.C. § 112(f).[4] Section 112(f) "operates to restrict claim limitations drafted in such functional language to those structures, materials, or acts disclosed in the specification (and their equivalents) that perform the claimed function." *Personalized Media Commc'n, LLC v. International Trade Comm'n*, 161 F.3d 696, 703 (Fed. Cir. 1998). "Failure to specify the corresponding structure in the specification amounts to impermissible pure functional claiming." *Ergo Licensing, LLC v. CareFusion 303, Inc.*, 673 F.3d 1361, 1363 (Fed. Cir. 2012). "Whether certain claim language invokes § 112[(f)] is an exercise in claim construction and is therefore a question of law . . . ." *Inventio AG v. ThyssenKrupp Elevator Americas Corp.*, 649 F.3d 1350, 1356 (Fed. Cir. 2011).

[4] Before the restructuring of the statute by the Leahy-Smith America Invents Act, Pub. L. No. 12-29, 125 Stat. 298 (2011), section 112(f) was known as paragraph 6 of 35 U.S.C. § 112. *Ibormeith IP, LLC v. Mercedes-Benz USA, LLC*, 732 F.3d 1376, 1377 n.1 (Fed. Cir. 2013).

A. Whether the Claims Are Means-Plus-Function Claims

The Court must first determine whether the claims at issue are governed by section 112(f). *See id.* at 1356-57. Where, as here, a claim uses the term "means," it "triggers a rebuttable presumption that § 112[(f)] governs the construction of the claim term." *Id.* at 1356 (citing *TriMed, Inc. v. Stryker Corp.*, 514 F.3d 1256, 1259 (Fed. Cir. 2008)). The presumption can be overcome "if 'the claim recites sufficient structure for performing the described functions in their entirety.'" *TecSec, Inc. v. International Bus. Mach. Corp.*, 731 F.3d 1336, 1347 (Fed. Cir. 2013) (quoting *TriMed*, 514 F.3d at 1259). A party challenging the presumption "bears the burden of overcoming [it] . . . by a preponderance of the evidence." *Apple Inc. v. Motorola, Inc.*, 757 F.3d 1286, 1298 (Fed. Cir. 2014).

Claim 72 is

> [a] system for relating electromagnetic waves to harmonic sound waves, comprising:
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> means for assigning one fundamental color of a color spectrum of twelve analogous colors to one of twelve fundamental tones of a musical 5th relationship, wherein the tones are represented by notes; and
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> means for consecutively associating the remaining analogous colors to the tones.

'235 patent at 61:53-60. Claim 74 is "[t]he system of claim 72, further comprising means for positioning twelve equidistant points on a circle representing twelve equal angle divisions of a circle, twelve directional vectors, twelve analogous colors and twelve equal tempered musical 5ths based on roots of 2." *Id.* at 61:66-62:3. Claim 75 is "[t]he system of claim 72, further comprising means for defining the color of frequency by defining the color of a chromatic frequency circle." *Id.* at 62:4-6.

The parties agree that all three claims are means-plus-function claims. They are therefore

indefinite if no "corresponding structure, material or acts [are] described in the specification [or] equivalents thereof." 35 U.S.C. § 112(f); *see also Ergo Licensing*, 673 F.3d at 1363.

B. Whether the Claim Specification Contains Corresponding Structure

A court should apply a two-step analysis to determine whether a means-plus-function claim is definite. "First, a court identifies the particular claimed function." *HTC Corp. v. IPCom GmbH & Co., KG*, 667 F.3d 1270, 1278 (Fed. Cir. 2012). The parties agree that claims 72, 74, and 75 have clearly described functions. The functions described in claim 72 are "assigning one fundamental color of a color spectrum of twelve analogous colors to one of twelve functional tones of a musical 5th relationship, wherein the tones are represented by notes" and "consecutively associating the remaining analogous colors to the tones." (Joint Claim Constr. & Pre-Hr'g Statement, Ex. A at 1-2). The function described in claim 74 is "positioning twelve equidistant points on a circle representing twelve equal angle divisions of a circle, twelve directional vectors, twelve analogous colors and twelve equal tempered musical 5ths based on roots of 2." (*Id.* at 2). And the function described in claim 75 is "defining the color of frequency by defining the color of a chromatic frequency circle." (*Id.* at 3).

"After identifying the particular claimed function, a court, in the second step of the analysis, looks to the specification and identifies the corresponding structure, material, or acts that form that function." *HTC Corp.*, 667 F.3d at 1278. Whether a specification adequately sets forth structure, material, or acts corresponding to a claimed function "is viewed from the perspective of one skilled in the art." *Id.* at 1279. "[A] means-plus-function clause is indefinite if a person of ordinary skill in the art would be unable to recognize the structure in the specification and associate it with the corresponding function in the claim." *Noah Sys., Inc. v.*

Intuit Inc., 675 F.3d 1302, 1312 (Fed. Cir. 2012) (quoting *AllVoice Computing PLC v. Nuance Commc'ns, Inc.*, 504 F.3d 1236, 1241 (Fed. Cir. 2007)).

Defendant contends that plaintiffs are required to provide an algorithm for claims 72, 74, and 75 because they are performed by a general-purpose computer. It is well-established that "if a patentee has invoked computer-implemented means-plus-function claiming, the corresponding structure in the specification for the computer implemented function must be an algorithm unless a general purpose computer is sufficient for performing the function." *Apple*, 757 F.3d at 1298. Put differently, "[i]f special programming is required for a general-purpose computer to perform the corresponding claim function, then the default rule requiring disclosure of an algorithm applies." *Ergo Licensing*, 673 F.3d at 1365.

Plaintiffs contend that because claims 72, 74, and 75 do not require a computer, they need not disclose a corresponding computer algorithm. According to the patent, the "currently contemplated best mode" of the invention is its execution "by a special or general purpose digital computer." '235 patent at 50:33, 50:37-38. The patent goes into great detail describing the way the invention can be executed by a computer. However, it does not require the use of a computer to perform the described functions. The references in the specification to a computer or software indicate that a computer or software can be used, but is not required. *See, e.g.*, '235 patent at 42:5-9 (describing "an embodiment that incorporates the wave language system in terms of an analogous color circle system, which can be implemented as a mechanical and/or an electronic training system, *for example as software*" (emphasis added)); *Id.* at 49:54-56 ("The wave language system, when used as a computer language, has a self-contained meaning independent from the code written by the programmer."). Indeed, the functions themselves, such as

"positioning twelve equidistant points on a circle representing twelve equal angle divisions of a circle," can be easily, if not precisely, done by hand. '235 patent at 61:67-62:1.

It is not clear whether a means-plus-function claim must have a corresponding algorithm if its function can, but need not, be performed by a computer. *Cf. Phillips*, 415 F.3d at 1323 ("In particular, we have expressly rejected the contention that if a patent describes only a single embodiment, the claims of the patent must be construed as being limited to that embodiment."). Indeed, the allegedly infringing products in this case are a type of computer software. However, the Court need not decide this issue. Even assuming that the corresponding structure for claims 72, 74, and 75 is a general-purpose computer, the patent specification discloses a corresponding algorithm for the functions described in those claims.

C. Whether the Specification Discloses an Algorithm

An algorithm is "a step-by-step procedure . . . for performing the claimed function." *Triton Tech of Texas, LLC v. Nintendo of Am., Inc.*, 753 F.3d 1375, 1379 (Fed. Cir. 2014). An algorithm "may be expressed 'in any understandable terms including as a mathematical formula, in prose, or as a flow chart, or in any other manner that provides sufficient structure' to a person of ordinary skill in the art." *Chicago Bd. Options Exchange, Inc. v. International Sec. Exch., LLC*, 748 F.3d 1134, 1141 (Fed. Cir. 2014) (quoting *Finisar Corp. v. DirecTV Grp., Inc.*, 523 F.3d 1323, 1340 (Fed. Cir. 2008)). "[A] challenge to a claim containing a means-plus-function limitation as lacking structural support requires a finding, by clear and convincing evidence, that the specification lacks disclosure of structure sufficient to be understood by one skilled in the art as being adequate to perform the recited function." *Id.* (quoting *Budde v. Harley-Davidson, Inc.*, 250 F.3d 1369, 1376-77 (Fed. Cir. 2001)).

1. Claim 72

There are two functions described in claim 72. The first function is assigning one fundamental color to one of twelve fundamental tones of a musical 5th relationship. '235 patent at 61:53-57. The second is associating the remaining colors to the other musical tones. Regarding those functions, the patent states:

> [T]he closest perceived tone relationship is the musical 5th and the closest color association is the analogous color. An analogous color is a neighboring color such that no other defined color is found in between neighboring colors; and it is similar in color to its neighbor. For example, if there are 12 defined colors and yellow and yellow-green are similar colors, and consecutive colors such that no other fundamental color exists between yellow and yellow-green, then yellow and yellow-green are analogous colors. Consider the mathematical series based on 3^n. The wave language system describes this mathematical series as a cycling through analogous color-tones. In the wave language system, the color-tone yellow is arbitrarily designed as the starting color-tone, such that every multiple of three (3) within the harmonic series represents a new analogous tone, as represented in FIG. 11.

Id. at 11:62-12:10.

In that section, the patent specification describes the functions in claim 72. As to the first function, the patent states that a color is arbitrarily designated as the starting color; the specification's example chooses the color yellow. *Id.* at 12:7-8. Figure 11 of the specification shows that the arbitrarily chosen color is then assigned to a specific musical tone; in Figure 11, the color yellow is assigned to the tone of C. *Id.*, figure 11.

As to the second function, the specification states that analogous colors are consecutively associated with the next multiple of three within the 3^n harmonic series. *Id.* at 12:3-10. According to the affidavit of plaintiff Mark Sandborn, a person of ordinary skill in the art would understand that the specification's reference to the multiple of three within the 3^n harmonic series "represents a mathematical relationship between frequencies separated by a musical fifth."

(Sandborn Aff., Docket No. 68, ¶ 6). Figure 14A shows a completed association of colors to musical tones, starting with the color yellow and the musical tone C. '235 patent, figure 14A.

Thus, the specification, figure 11, and figure 14A describe a process by which a color is arbitrarily selected as a starting color and assigned to an arbitrarily selected musical tone. The next analogous color, as defined by the specification, is assigned to the next musical tone in the musical circle of fifths. That step-by-step explanation, as understood by someone with ordinary skill in the art, is sufficient to disclose an algorithm for the functions described in claim 72. *See Typhoon Touch Techs., Inc. v. Dell, Inc.*, 659 F.3d 1376, 1386 (Fed Cir. 2011) (finding patent that described "cross-referencing" as "the matching of entered responses with a library of possible responses, and, if a match is encountered, displaying the fact of the match" was sufficient to disclose an algorithm).

Defendant contends that under *Aristocrat Techs. Australia Pty Ltd. v. International Game Tech.*, 521 F.3d 1328 (Fed. Cir. 2008), the specification "simply describes the function to be performed, not the algorithm by which it is performed." 521 F.3d at 1334. The function at issue in *Aristocrat* was "to pay a prize when a predetermined combination of symbols is displayed in a predetermined arrangement of symbol positions selected by a player." *Id.* There was no corresponding step-by-step instruction of how to pay that prize. *Id.* at 1334-35. Instead, the patent's prose, figures, and tables provided "examples of how player selections translate to possible winning combinations." *Id.* at 1335.

The patent specification and figures in this case differ because they describe how to perform the functions in claim 72 instead of merely describing the results of those functions. Under *Aristocrat*, "an extremely detailed disclosure of all information necessary to perform the

function, except for basic mathematical techniques that would be known to any person skilled in the pertinent art," is sufficient to disclose an algorithm. *Id.* at 1336. The claim in this case is bounded by the step-by-step process described in the specification: that of arbitrarily choosing a color, associating that color with another arbitrarily chosen musical tone, and associating analogous colors with other musical tones based on the musical circle of fifths. *See Typhoon Touch*, 659 F.3d at 1386.

Defendant has therefore failed to show, by clear and convincing evidence, that claim 72 lacks structure. Accordingly, that claim will not be construed as indefinite.

2. Claim 74

The function described in claim 74 is, in conjunction with the system of claim 72, "positioning twelve equidistant points on a circle representing twelve equal angle divisions of a circle, twelve directional vectors, twelve analogous colors and twelve equal tempered musical 5th based on roots of 2." '235 patent at 61:67-62:3. The parties have agreed that this means "[a]ssigning colors to tone through the use of a circle divided into 12 equal sections which represents a 12 color equal tempered color wheel and 12 equal tempered musical fifths, as illustrated by [f]igure 16B of the '235 [p]atent." (Joint Claim Constr. & Pre-Hr'g Statement, Ex. B ¶ 11).

According to the patent specification, figure 16B "illustrates that the establishment of equal tempered color centers establishes the fundamental vector directions of color based on equal angle divisions of a circle." '235 patent at 14:49-53. The figure itself is a picture of a circle split into twelve equal sections. *See id.*, figure 16B. Each line ends in an arrow pointing outward at the circumference of the circle, and each line is associated with a certain color and

musical tone. *See id.*

In essence, "[c]laim 74 is a refinement of [c]laim 72 that associates tones and colors through the use of a twelve color equal-tempered color wheel and twelve equal-tempered musical 5ths." (Sandborn Aff. ¶ 11). In reading the specification and examining figure 16B, a person skilled in the art would recognize that the function in claim 74 is using five devices to represent visually the function of claim 72 (the assignment of colors to tones based on the musical circle of fifths). Those five devices are "(1) 12 equidistant points on a circle; (2) twelve equal angle divisions; (3) twelve directional vectors; (4) twelve equal tempered musical 5ths based on roots of 2; and (5) the color assignment required by claim 72." (*Id.*).

Thus, the patent describes a process where specific colors are assigned to specific tones as described in claim 72. Those color-tone combinations are then equally spaced around a circle that is split into twelve, equally sized parts. *See* '235 patent at 14:10-58. That step-by-step explanation, as understood by someone with ordinary skill in the art, is sufficient to disclose an algorithm for the function described in claim 74. *See Typhoon Touch*, 659 F.3d at 1386.

Defendant has therefore failed to show, by clear and convincing evidence, that claim 74 lacks structure. Accordingly, that claim will not be construed as indefinite.

3. <u>Claim 75</u>

The function described in claim 74 is, in conjunction with the system of claim 72, "defining the color of frequency by defining the color of a chromatic frequency circle." '235 patent at 62:5-6. The parties have agreed that the term "chromatic frequency cycle" means "[t]he twelve tones of the chromatic scale, in their customary order, as shown in Fig. 18, which may be repeated across octaves." (Joint Claim Constr. & Pre-Hr'g Statement, Ex. B ¶ 13). They

have also agreed that the term "the color of a chromatic frequency cycle" means "[t]he set of 12 colors assigned to a chromatic frequency cycle in the order set forth in Figure 18 of the '235 [p]atent, such as yellow, red-violet, green, red-orange, blue, yellow-orange, violet, yellow-green, red, blue-green, orange, and blue-violet." (*Id.* ¶ 14). Finally, they have agreed that the term "defining the color of frequency" means "[d]esignating a color to represent a tone." (*Id.* ¶ 12).

According to the patent specification,

> FIG. 17 shows the first 45 overtone harmonics described using the wave language system, starting with a yellow tone. Note that as the series progresses, an alternating color pattern develops consisting of nearly complementary colors. . . . Further analysis of FIG.17 reveals a tone pattern that is equivalent to the musical chromatic scale or consecutive notes in the western music tradition, as shown in FIG. 18. Shown is the chromatic scale 1810 and the harmonic color pattern 1820.

'235 patent at 14:59-15:5. Figure 18 is a diagram showing colors associated with tones as described in claim 72 and Figure 16B, ordered in a chromatic scale instead of in a circle. *See id.*, figure 18.[4]

Thus, the specification and Figure 18 show a step-by-step process where specific colors are assigned to specific tones as described in claim 72. Those color-tones are then ordered according to a chromatic musical scale (as opposed to in a circle, as in claim 74). (*See* Sandborn Aff. ¶ 17). Once that ordering is established, the color of a tone is designated elsewhere by reference to the color-tone scale. (*Id.*). That step-by-step explanation, as understood by someone with ordinary skill in the art, is sufficient to disclose an algorithm for the function described in claim 75. *See Typhoon Touch*, 659 F.3d at 1386.

Defendant has therefore failed to show, by clear and convincing evidence, that claim 75

[4] A chromatic scale is a series of notes in the western musical scale consisting entirely of half steps. (*See* Joint Claim Constr. & Pre-Hr'g Statement, Ex. B ¶¶ 15-16).

lacks structure. Accordingly, that claim will not be construed as indefinite.

IV. Conclusion

For the foregoing reasons, the Court holds as follows:

1. the disputed claim term "consecutive chromatic colors" in claim 102 is construed to mean "consecutive colors assigned by the invention to consecutive chromatic tones." Figure 18 of the '235 patent illustrates an example of consecutive chromatic colors.

2. claims 72, 74, and 75 are not indefinite.

So Ordered.

/s/ F. Dennis Saylor
F. Dennis Saylor IV
United States District Judge

Dated: October 20, 2014